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| 10/669,519 | 09/24/2003 | Kuldeep Simha | 200209671-1 | 4341 |

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EXAMINER

KRAVETS, LEONID

ART UNIT PAPER NUMBER

2189

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|------------------------------|--|
| Office Action Summary | Application No. 10/669,519 | Applicant(s) SIMHA ET AL. | |
| | Examiner Leonid Kravets | Art Unit 2189 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 9-15 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16-18 is/are allowed.
- 6) ☒ Claim(s) 1-8 and 19-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 9-15 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 24 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>2 IDS</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C.

121:

- I. Claims 1-8 and 16-24, drawn to fields in a content addressable memory, classified in class 711, subclass 108.
 - II. Claims 9-15, drawn to address translation using translation look-aside buffers, classified in class 711, subclass 207.
2. Inventions I and II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, a CAM and a TLB can be used separately for searching and address lookup.

See MPEP §806.05(d).

3. During a telephone conversation with William Streeter on September 23, 2005 a provisional election was made with traverse to prosecute the invention of group I, claims 1-8 and 16-24. Affirmation of this election must be made by applicant in replying to this Office action. Claims 9-15 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

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4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Information Disclosure Statement

5. Acknowledgement is made of the information disclosure statement received on 9/24/2003.

6. Acknowledgement is made of the information disclosure statement received on 3/21/2005.

Title

7. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "System of Searching Fields of a Content Addressable Memory".

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

9. Claims 1, 6-8, 19 and 21-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Khieu et al. (US Patent 6,493,790).

10. As per claim 1, Khieu discloses a content addressable memory (CAM) system comprising:

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at least one CAM entry comprising a plurality of CAM fields (Col 5, lines 52-53);

at least one input selector that controls access to the plurality of CAM fields, such that retrieval of a subset of the plurality of CAM fields is selectively enabled (Col 5, lines 53-55); and

a match evaluator that compares an enabled subset of CAM fields to a search value [Khieu discloses that CAM cell groups can be included or excluded from comparison with the compare signals, a current limiting device is further disclosed (Col 5, lines 53-56, Col 2, lines 17-19).

11. As per claim 6, Khieu discloses the system of claim 1, further comprising a driver that provides a control input to the input selector and provides a given search value to the match evaluator (Fig 4, Ref 47.

12. As per claim 7, Khieu discloses a memory cache system comprising the system of claim 1 (Fig 1).

13. As per claim 8, Khieu discloses a processor assembly comprising the memory cache system of claim 7 (Fig 1).

14. As per claim 19, Khieu discloses a method of searching a content addressable memory comprising:

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selecting a first CAM field from a memory entry comprising at least a first CAM field and a second CAM field (Col 5, Lines 53-55); and

enabling access between comparison logic associated with the CAM and the selected first CAM field [comparison lines from each CAM cell are attached to the current limiting device (Fig 4, Ref 47)].

15. As per claim 21, Khieu discloses the method of claim 19, the selecting of a first CAM field comprising providing a control signal to one or more input selectors [enable signal of current limiting device (Fig 4, Ref 47)].

16. As per claim 22, Khieu discloses a system for searching a content accessible memory (CAM) comprising:

means for selectively enabling access to a plurality of CAM fields, such that a subset of the CAM fields can be enabled (Col 5, Lines 53-55);

means for comparing the enabled subset of CAM fields to a search value (Col 5, lines 53-56 and Col 6, Lines 41-45).

17. As per claim 23, Khieu discloses the system of claim 22, the means for selectively enabling comprising means for selecting the subset of CAM fields according to an associated control signal [enable signal of current limiting device (Fig 4, Ref 47)].

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

20. Claims 2-3, 20, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khieu as applied to claim 1 above, and further in view of Threewitt (US Patent 5,383,146).

As per claim 2, Khieu discloses the system of claim 1, the plurality of CAM fields comprising at least one CAM field associated with a virtual address. Khieu does not disclose at least one CAM field associated with a physical address. Khieu discloses that the virtual addresses in a CAM are searched and upon a hit the associated physical address is retrieved from a RAM paired to the CAM (Col

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1, Lines 59-67). Further, Threewitt discloses a CAM functioning as a RAM (Col 6, Lines 20-23). Thus the physical addresses of Khieu's RAM can be stored in a CAM field.

As per claim 3, Khieu discloses the system of claim 2, the at least one input selector comprising a plurality of input selector components, a given input selector component enabling access to one of a CAM field associated with the physical address and a CAM field associated with the virtual address (Khieu discloses the CAM cell groups can be selectively included or excluded from comparison (Col 5, line 53-55)).

As per claim 20, Khieu discloses a method of claim 19, the first CAM field comprising one of a virtual address and a physical address. Khieu discloses the other field being stored in a RAM. Further, Threewitt discloses a CAM functioning as a RAM (Col 6, Lines 20-23). Thus, the physical addresses of Khiue's RAM can be stored in a CAM field

As per claim 24, Khieu discloses the system of claim 22, at least one of the plurality of CAM fields representing a virtual address. Khieu discloses a physical address field being stored in a RAM. Threewitt discloses a CAM functioning as a RAM (Col 6, Lines 20-23). Thus, the physical addresses of Khiue's RAM can be stored in a CAM field.

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the CAM cells functioning as RAM cells of Threewitt into the system of Khieu, since Khieu and Threewitt form the same field of endeavor, namely CAM memories and this would allow for better performance in searching.

21. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khieu.

As per claim 4, Khieu discloses the system of claim 1. The match evaluator of Khieu is an operational amplifier. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use pull down transistors to achieve the same effect.

As per claim 5, Khieu discloses the system of claim 1. Khieu does not disclose the at least one input selector comprising at least one multiplexer. A multiplexer is well known in the art as a device for selecting an input from multiple ones of inputs. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a multiplexer to select an input.

Allowable Subject Matter

22. Claims 16-18 are allowed.

Conclusion

24. The following is text cited from 37 CFR 1.111(c): In amending in reply to a rejection of claims in an application or patent under reexamination, the applicant or patent owner must clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. The applicant or patent owner must also show how the amendments avoid such references or objections.

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonid Kravets whose telephone number is 571-272-2706. The examiner can normally be reached on M-F, 8-4:30.

27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim can be reached at 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

28. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

L.h.
Leonid Kravets
Patent Examiner
Art Unit 2189


BEHZAD JAMES PEIKARI
PRIMARY EXAMINER

September 28, 2005